

Interviewee: Dr. On-On “Joanne” LEE, Fisheries Officer (Aquaculture Environment), Agriculture, Fisheries and Conservation Department, HKSAR

Interviewer: Yee-Ki “Alice” TO

Interview Setting: 2 email replies; 5 Aug 2015 and 19 Aug 2015

Ms LEE: Algal blooms are natural phenomena in which the rapid multiplications of microscopic, unicellular algae discolour the water by the pigments contained in the algal cells. The Agriculture, Fisheries and Conservation Department started to record the occurrences of algal blooms in Hong Kong since 1975 and carried out phytoplankton monitoring since 1990. The phytoplankton monitoring programme aims at detecting the presence of toxic algae or development of harmful algal blooms, in order to provide early warning to mariculturists and other concerned parties. Phytoplankton samples are collected weekly from six fish culture zones, fortnightly from another 5 fish culture zones and five offshore stations and quarterly at the remaining 15 fish culture zones to detect the presence of harmful algae and development of red tides. Sampling frequency would be stepped up when harmful algal species or abnormally high phytoplankton population is detected.

You may wish to visit the following link for more information on monitoring and management of algal blooms in Hong Kong: <http://www.afcd.gov.hk/english/fisheries/hkredtide/redtide.html>.

Concerning the **phytoplankton monitoring programme**, one of the aims is to related the possible links between changes in the phytoplankton community and the nutrient levels in marine water.

1. How do AFCD monitor the nutrient concentrations in marine water? Would the changes of concentration over a period of time be monitored?
2. When will AFCD monitor the water nutrient concentrations? E.g. every day or only when there are incidents, like algal bloom? If it is a continuous measurement, does it help foresee ecological problem like algal bloom?

AFCD has been conducting routine water quality monitoring (including inorganic nutrients analysis) at 26 fish culture zones and 5 offshore stations in Hong Kong since 1993. Water samples are collected biweekly from the 6 core fish culture zones (O Pui Tong, Tap Mun, Yim Tin Tsai, Kau Sai, Lo Tik Wan and Ma Wan), monthly for the other 19 fish culture zones and 5 offshore stations (Round Island, Bluff Island, East Lamma Channel, West Lamma Channel and Sha Chau). Since algal bloom can be initiated and substantiated by natural or anthropogenic factors, or a combination of both, forecasting its occurrence based on the currently available data is still difficult at this stage.

3. What is the device or analytical method used for measuring N,P & K in water sample in AFCD? Is it a portable device that floats on the sea for a long period of time?

The concentrations of inorganic nutrients (nitrate, nitrite, ammonium, phosphate and silicate) are determined by the standard methods (Standard Methods for the Examination of Water

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and Waste Water, 21st edition, 2005). However, potassium (K) is not covered in our monitoring programme.

4. How fast technician can know about the results? How important speed is in knowing the concentrations in sewage treatment?
The turnaround time is normally 2 weeks but for urgent cases, data could be delivered in 2-7 days.
5. Is it an accurate measurement?
6. Is it a specific measurement? How specific it is?
7. Concerning the concentration detection limit, is there a limited range for concentration detection?
8. Are there any other limitations for the present method?

Please refer to Standard Methods for the Examination of Water and Waste Water, 21st edition, 2005 and equipment specifications from manufacturers for more details.

9. Biosensor

- a. Have you ever heard of local and foreign organisations using biosensor for detecting particular compounds (e.g. proteins, ions, hormones, toxins, plastics, etc) in water samples?
- b. If yes, what are the benefits that make people use? (e.g. fast? cheaper? specific?)

10. Microbial biosensor

As for our project, we are trying to genetically modify *E. coli*, which can possibly detect the concentration of nitrite-nitrate (indistinguishable by the bacteria), phosphate, and potassium ion, i.e. a MICROBIAL biosensor. The hypothetical device is immobilising these bacteria in a sensing part of the biosensor, with signal transduction to produce readable data, maybe, on computer. It is hoped that we can give immediate results similar to probes; therefore, suggest making a floating device, which is located near the shore.

- a. What criteria that the microbial biosensor should acquire such that it is preferred?
- b. Are you aware of safety issues?
- c. In case, the encapsulated GM bacteria, which should be immobilised in the biosensor, is broken, GM bacteria are released in the sea. Regardless of its functions, how do you think of a device like this? Is it paradoxical to use devices, which, in the end, pollute the sea?
- d. If safety is a concern, regardless of its benefits, should we use or would you use such a device?

We are not using any biosensor for our monitoring programme and thus we do not have specific comments on its application.